July 22, 2010

RB&G
ENGINEERING, INC.

Mark Greenhalgh
Nielson Construction
P.O. Box 620
Huntington, UT 84528

Dear Mark:

We received a call from Henry Taylor on Wednesday afternoon, July 21, 2010. He stated that a failure scarp had developed in the slope west of the railroad line, just south of the area where the failure scarp occurred in 2009. It was reported that the failure arc is about 60 feet high, 100 feet wide at the base, and has dropped about 6 feet at the top. Henry e-mailed photos of the slide. This is the third failure scarp that we have observed along the over steepened slope.

The geologic setting of the hillside was described by our engineering geologist (M. Hansen) during an evaluation of the slide which occurred during February, 2009 just north of the subject site. Excerpts from our February 9, 2009 letter are as follows:

> "On 2/6/09 I examined the excavation into the hillside and the toe of the slope along the area where the railroad tracks had been removed. The tracks had extended to the north out of the tunnel entrance located about 1,500 feet south of the rockslide area. Geologic maps of the area show the Moab Fault (normal fault) with down to the east movement extending from the tunnel and paralleling the old railroad tracks and the hillside. In this area, the fault is seen as offsetting Pennsylvanian age Honaker Trail Formation, sandstone, limestone and siltstone on the west, with younger Triassic age Moenkopi Formation mudstones on the east. As the fault parallels the old railroad tracks, it undulates along the hillside with some areas bringing the fault trace out to the surface of the slope, exposing only the underlying Honaker Trail Formation with the Moenkopi Formation excavated or eroded away.
>
> An examination of the hillside found the rockslide to be located within an area where a relatively thin sliver of Moenkopi mudstone is plastered up against the older Honaker Trail Formation, with the two units separated by the fault. …
>
> The Moenkopi mudstone in this area is very highly fractured, deformed and weakened due to the close proximity of the main fault trace. The mudstone exposed at the cut is part of the shear zone associated with the main fault. "

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The above description appeared, from the photos, to be applicable to the present slide. Our engineering geologist, Michael Hansen, visited the site this morning and made the following observations:

- The head of the failure scarp appears to be approximately 80 to 100 feet above the roadway.
- The base of the slide extends horizontally 150 to 200 feet.
- The activated mass at the edges, which could be observed, is about 2 to 3 feet thick and has separated about 8 feet at the head of the slide.
- The slope of the failure surface varied from 20 to 33 degrees where measurements were taken along the edge of the slide.
- The overall existing cut slope is at about 40 degrees in this area.
- The thickness of the mudstone within the slide mass is unknown.

The Moenkopi mudstone is underlain by more competent units of the Honaker Trail Formation. Due to the limited mass of unstable mudstone, we do not envision a catastrophic type of slide movement which would extend to the railroad tracks. Based upon observations made, it is recommended that a barrier be installed between the roadway and the toe of the slide to prevent loose material from raveling down slope onto the roadway until long term remedial work can be completed. We also recommend daily monitoring of the slide area until long term remedial action is completed.

To accurately define the most efficient remedial action requires performing a stability analysis for the existing slide. This would require 2 to 3 test borings through the slide area to define the failure surface and thickness of mudstone. Once the failure surface has been defined, the residual strength could be determined and remedial design performed.

An alternate to performing the investigations to provide for remedial design is to flatten the existing slopes and treat the failure surface, recognizing that the work may or may not be conservative and that additional work may be required in the future. Since the mass of the unstable mudstone is limited and a catastrophic type of failure is unlikely, it is our opinion that this represents a viable option.

It is recommended that a survey be performed to define the existing topography. It is recommended that the slope be cut back to 1.5 horizontal to 1 vertical or flatter through the mudstone and 1:1 or flatter in the siltstone, sandstone and limestone members of the Honaker Trail Formation above the failure scarp. We recommend that the slip surface be over excavated to a depth of at least 2 feet, with 1.5:1 or flatter side slopes and backfilled with clay compacted to

at least 95% of the maximum density as determined by ASTM D 698 to reduce the risk of surface water entering along the failure surface.

If there are any questions regarding the information contained herein, please call.

Sincerely,

RB&G ENGINEERING, INC.

Bradford E. Price, P.E.
Principal Geotechnical Engineer

Cc: Brent Anderson, Energy Solutions